ENDOTOXIN EXPOSURE, TLR4 MUTATIONS, SMOKING, AND WORK-RELATED BEHAVIORS: PULMONARY FUNCTION DEFICITS AMONG POTENTIALLY SUSCEPTIBLE SUBGROUPS OF AGRICULTURAL WORKERS IN COLORADO AND NEBRASKA

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Background and Aims: Organic dust inhalation has been associated with adverse respiratory responses among agricultural workers. Susceptibility to the adverse health effects resulting from these agricultural exposures may be related to: constituents of the dust, e.g. endotoxin; intrinsic factors, e.g. genetic traits; and extrinsic factors, e.g. smoking and work-related behaviors.
Methods: This study quantified breathing-zone personal work shift exposures to inhalable dust, endotoxin, and its 3-hydroxy fatty acid (3-OHFA) constituents, and evaluated pulmonary function before and after the work shift among 136 cattle feedlot, dairy, grain elevator, and corn farm workers. General linear models were used to assess the multivariable relationships between dust exposures and lung function (forced vital capacity, FVC; forced expiratory volume in 1 second, FEV_1; and the FEV_1/FVC ratio). Genotyping of SNPs in two polymorphisms in the TLR4 gene (TLR4 299 and 399) was performed.
Results: Geometric mean dust levels were similar among feedlot (1.53mg/m^3; n=59), dairy (1.45mg/m^3; n=15), and farm (1.58mg/m^3; n=9) employees and elevated among grain elevator operators (2.03mg/m^3; n=53). Endotoxin concentrations were similar across all facility types. Increased dust exposure was associated with work shift decrements in FVC and FEV_1. These relationships were stronger among current smokers and those reporting application of pesticides/herbicides at work or home (interactions between dust and smoking and between dust and pesticide use, p• 0.05); however, no evidence of increased susceptibility was observed among those living on a farm. Interactions between dust/endotoxin exposures and genetic mutations were observed ($p<0.05$), although the small number of participants with genetic mutations limits interpretation. Further analyses will identify additional factors that may confer increased susceptibility to the adverse pulmonary effects (cross-shift and pre-shift) of agricultural exposures.
Conclusions: A better understanding of factors leading to increased susceptibility for the development of adverse respiratory outcomes is needed to optimize prevention strategies among agricultural workers.